

CURRENT LITERATURE.

Essentials of Botany.¹

WHEN Professor Bessey began to publish his text-books the botanical instructors of the United States were teaching chiefly the gross morphology and classification of "flowering plants" as presented by Gray's fascinating text and manual. A larger view of plants had taken possession of Germany, and this view Professor Bessey sought to transplant. How well he succeeded is witnessed by the revolution that followed in American botanical teaching, especially in the colleges. The ready response, the adoption of real laboratory methods, the multiplication of texts and laboratory guides on the new basis, all show how great was the need. Among all the American books, however, which belong to the new dispensation, those of Professor Bessey fairly stand as the pioneers. His very large and successful experience as a teacher has peculiarly fitted him for the work, and has enabled him to organize the text and touch the needs in a way quite beyond the comprehension of the mere investigator.

It is with great pleasure that we welcome the new edition of his very useful "Essentials," for the rapid advance of the science had left the old one inadequate in many important particulars, which the author appreciated more keenly than any one. As the book has been and must continue to be one of the most largely used texts it is to the interest of botany for it to present current views. The most notable change is to be found in the new chapter on plant physiology, a subject which has been made a science since the old text was written. Protoplasm and the cell-structures are also freshly presented in the light of new knowledge. In the matter of classification, Professor Bessey has his own views, presented to the botanical public before, and now in his new book. His rejection of the slime-moulds as plants, and his similar but not so positive disposition of *Pandorina* and *Volvox*, may simplify classification, but probably will not satisfy botanists. The breaking up of Thallophyta into three great groups (Protophyta, Phycophyta and Carpophyta) coordinate with Bryophyta, etc., and the submergence of the well known categories Algæ and Fungi, is a view which will have to fight its way, but has undoubtedly the merit of easy presentation to beginners. We wish that

¹BESSEY, CHARLES E.—The Essentials of Botany. Sixth Edition, revised and enlarged. 1896. New York: Henry Holt & Co.

Professor Bessey had abandoned the term "Anthophyta," as but little more appropriate than "Phanerogamia," and adopted the really significant term "Spermatophyta" (too often written "Spermaphyta"); and that his popular name "flowering plants" had been changed to "seed-plants."

In the presentation of the angiosperms Professor Bessey follows neither the grouping and sequence of Bentham and Hooker, nor of Engler and Prantl, but has formulated one of his own. That the presentation of Bentham and Hooker should be abandoned is clear; but those of Engler and Prantl, and of this book are based upon opposite propositions which the morphology of the future must settle. Bessey's proposition that "in the primitive flower all the parts were separate" coincides with the Engler position as far as it goes. But Bessey's "primitive flower" has some or all the parts in a cyclic arrangement, and then calls for the reduction process to produce the simpler flowers. Engler, on the contrary, sees in these simpler flowers not reduced forms but primitive forms; his primitive flowers having free parts, to be sure, but these parts spirally arranged and consequently indefinite in number, the cyclic arrangement and hence definite numbers appearing later. Whether the so-called "simpler flowers" are so because of reduction or because they are primitive is as yet largely a matter of opinion, and Professor Bessey has chosen the former alternative.

But such a discussion leads us far away from the purpose of the book before us, which is certainly an effective recasting of a long-tried and very useful text.

Citrous fruits.

MESSRS. W. T. SWINGLE AND H. J. WEBBER, of the Division of Vegetable Physiology and Pathology, Department of Agriculture, have been working for three years in the subtropical laboratory at Eustis, Florida, upon the diseases of citrous fruits. Bulletin no. 8 has just been issued from the Division, giving for the first time the results of their work upon the principal diseases. Six diseases are presented: blight, die-back or exanthema, scab or verrucosis, sooty mold, foot-rot or mal-di-gomma, and melanose. In each case the symptoms, cause, and treatment are described, illustrated by eight plates, three of them colored. While much of the Bulletin deserves reprinting and wide attention, the following outline from the summary may indicate a few of the results:

1. *Blight*: Attacks trees only when over five years old and in bearing, causing sudden wilting of the leaves; in the spring after the top

wilts the branches bloom profusely, but the flowers are small and almost never set fruit; the affected trees may linger for many years, and rarely die outright; the annual loss from this disease in Florida is about \$150,000; the cause is unknown, but it is probably a contagious malady and incurable; affected trees should be dug up and burned.

2. *Die-back* or *exanthema*: Caused by malnutrition, accompanied by improper drainage, improper cultivation, etc.; recognized by the very large dark pointed leaves and the reddish-brown stains on certain of the new-growth twigs, which later die back; brown eruptions occur abundantly on young and old twigs, all of which finally die back; multiple buds form in the leaf axils; diseased trees bear little fruit, which is off color and commonly disfigured by the reddish-brown stain; annual loss from the disease in Florida about \$100,000; withholding all organic nitrogenous manures, ceasing to cultivate, and mulching the soil have been found beneficial.

3. *Scab* or *verrucosis*: Attacks principally sour oranges and lemons, the common sweet orange being exempt; probably introduced into America from Japan; shows as small excrescences on young leaves and fruit, at first pale, but soon coated with a dusky growth of *Cladosporium*, the parasite causing the disease; very much distorts young leaves and the fruits; loss chiefly from action on lemons, causing an annual loss in Florida of about \$50,000; prevented on lemons by spraying young fruits from three to five times with ammoniacal solution of copper carbonate.

4. *Sooty mold*: A black fungus, which follows the attacks of certain honeydew-secreting insects; recognized by the sooty black membrane formed principally over upper surfaces of leaves, fruits, and stems; greatly reduces productivity of trees, and the oranges formed are badly disfigured; annual loss in Florida from the disease about \$50,000; spraying with resin wash has been found very effective, also fumigation with hydrocyanic acid gas; a parasite fungus (*Aschersonia tahitensis*) promises to be a very great aid in combating the malady.

5. *Foot rot* or *mal-di-gomma*: The most widespread of all orange diseases; recognized by exudation of gum from patches on the tree near the base, resulting in falling off of the bark; spreads down the roots and around the trunk, the tree often being girdled and killed; apparently contagious and caused by some minute organism; the sour orange almost exempt, and disease may be prevented by using sour orange stocks on lowlands and flat woods, and grape fruit stocks on high and dry pine lands; removing soil from around the crown roots the most effective treatment; annual loss from the disease in Florida about \$100,000.

6. *Melanose*: A new disease, not yet causing much damage in Florida, probably only about \$5,000 in 1894; forms minute brown spots on leaves, twigs, and fruits, greatly staining and disfiguring the fruit; cause not certainly known, but probably some parasitic fungus; very effective remedy is the application of Bordeaux mixture or ammoniacal solution of copper carbonate to the young fruits.

A manual on the food of plants.

Elementary guides to simple laboratory practice, constructed upon approved methods, are not yet numerous, and must be always welcome. In many respects the little pocket manual on the food of plants, prepared by A. P. Laurie,¹ is a model. It is arranged in a strictly logical sequence, is inductive in method, and brings the subject within the apprehension of the beginner. The aim of the work is to show the elementary composition of plants, the source of food supply and to some extent the manner in which plants obtain their food. The author seems to think that this leads, as a matter of course, to agricultural chemistry, but on the contrary it is quite as good an introduction to vegetable physiology, or even better. The work was written for use in Great Britain; and in many parts of the United States and Canada the chapter on the derivation of soils from primitive rock would need modification to apply to the drift region.

The work consists of thirty-three simple laboratory experiments with only enough text to bind them together. They would be most excellent for high school work, or any elementary course where pupils are under the guidance of a teacher.

Minor Notices.

A SMALL WORK on vegetable culture, by Alexander Dean,² has come to us for notice. It is a concise manual for practical instructions for raising the vegetables in ordinary use in Great Britain, but is not specially applicable to the conditions and requirements in America. It will interest those who are curious about the methods of English culinary gardening, as the work is well written.

THE WORK of Arthur and Bolley on *Bacteriosis of Carnations*, issued as bulletin 59 of Purdue University, deserves more than the pass-

¹ LAURIE, A. P.—The food of plants: an introduction to agricultural chemistry. London and New York, Macmillan & Co. 1893. 16mo. pp. ix+77. Illustrated.

² DEAN, ALEXANDER.—Vegetable culture: a primer for amateurs, cottagers, and allotment-holders. Edited by J. Wright. London and New York, Macmillan & Co., 1896. 16mo. pp. 136. 38 illust. in text. 35 cents.

ing notice on p. 252 which the senior author gave it. Although preliminary notices of this work have been given in various places, the full paper is now published for the first time with adequate illustrations and is particularly important as making known the symptoms, nature, and preventive treatment of another bacterial disease. The disease was discovered by Dr. Arthur in 1887-8. In January, 1889, Mr. Bolley's work began and continued for about a year and a half, since which time Dr. Arthur has continued the investigation.

Bacteriosis is a widespread disease of carnations, affecting primarily the leaves, thereby checking growth and productiveness. It is caused by a parasitic bacterium, entering the plant from the air through stomata or the punctures of aphides, which has been isolated and described as a new species, *Bacterium Dianthi*. The disease shows itself first by producing minute translucent yellowish spots, visible when the leaf is looked at against a strong light. These spread and the leaf finally withers and dries up. Other pinks may be artificially infected but the chief damage is to carnations, especially old and weak or poorly grown plants. It may be almost wholly prevented by keeping the foliage dry and free from aphides. Wire netting bent into Λ -shape and placed between the rows of plants supports the foliage and permits proper watering without wetting the leaves. Overhead spraying should be done occasionally on bright days with water containing a small amount of ammoniacal copper carbonate.

The paper is illustrated by eight plates, of which two are remarkably fine chromolithographs. The four drawn by Mr. Bolley are rather crude. Two others are half-tones, showing proper methods of growing in houses at Lafayette, Ind., and Queens, N. Y.